Clinical Policy: Ventricular Assist Devices

Reference Number: LA.CP.MP.46 Coding Implications
Date of Last Revision~~ew Date~~: ~~3/21~~5/22 Revision Log

See Important Reminder at the end of this policy for important regulatory and legal information.

Description

A ventricular assist device (VAD) is a mechanical pump that helps a person's heart that is too weak to pump blood through the body. The VADs are~~is~~ designed to ~~provide sufficient~~enhance blood flow to the ~~damaged or diseased heart~~bodily organs, either in conjunction with, or as a replacement for, a damaged or diseased heart. A VAD can be used in both an acute and subacute setting for patients who have poor heart function as a temporary measure as either a~~. It is sometimes referred to as a~~ "bridge to ~~transplant~~recovery" a VAD is often used as an adjunctive device in high-risk percutaneous coronary interventions.~~since it can help a patient survive until a heart transplant can be performed~~.

Policy/Criteria

I. It is the policy of Louisiana Healthcare Connections that all FDA approved ventricular assist devices (VADs), when used according to their FDA labeled indications (including body size recommendations), are considered **medically necessary** when meeting the following:

A. For implantable VADs, none of the following contraindications:
   1. Life expectancy in the absence of heart disease ≤ 2 years;
   2. Malignancy within 5 years that is expected to significantly limit survival;
   3. Irreversible renal or hepatic dysfunction, severe obstructive pulmonary disease, or other systemic disease with multi-organ involvement;
   4. A pattern of demonstrated noncompliance or lack of sufficient care-giver support which would place a VAD at serious risk of failure;
   5. Active substance abuse, including alcohol.

B. Has one of the following indications:
   1. Post-cardiotomy for support of blood circulation;
   2. Bridge to transplant for members/enrollees who are awaiting heart transplant (or undergoing evaluation to determine candidacy for heart transplant) and not expected to survive until a donor heart can be obtained;
   3. Destination therapy for members/enrollees with end-stage heart failure (NYHA Class IV end-stage left ventricular failure for at least 90 days with a life expectancy of ≤ 2 years) who are ineligible for heart transplant due to age or co-morbidities and all of the following:

~~1. Member/enrollees is post-cardiotomy for support of blood circulation;~~
~~2. As a bridge to transplant for members/enrollees who are awaiting heart transplant and not expected to survive until a donor heart can be obtained;~~
~~3. As destination therapy for members/enrollees with end-stage heart failure (NYHA Class IV end-stage left ventricular failure for at least 90 days with a life expectancy of < 2 years) who are ineligible for heart transplant due to age or co-morbidities and all of the following:~~

   a. Meets one of the following:
      i. No response to optimal medical management (including beta-blockers and ACE inhibitors, if tolerated) for at least 45 of the last 60 days;

ii. Balloon pump-dependent for ≥7 days;
iii. IV inotrope-dependent for ≥14 days;
iv. Cardiac Index (CI) <2.2 L/min/m2, while not on inotropes and meet one of the following criteria:
~~i. Failure to respond to optimal medical management (including beta-blockers and ACE inhibitors if tolerated) for at least 45 of the last 60 days, or~~
~~ii. Has been balloon pump-dependent for ≥7 days, or~~
~~iii. IV inotrope-dependent for ≥14 days *and*~~

b. Left ventricular ejection fraction (LVEF) < 25%, and
c. Functionally limited with a peak oxygen consumption of ≤14 ml/kg/min unless balloon pump- or inotrope-dependent, or physically unable to perform the test.

II. Pediatric-specific ventricular assist devices are considered **medically necessary** if FDA approved or approved under the FDA Humanitarian Device Exemption (HDE) guidelines and used in accordance with the device specific inclusion and exclusion criteria, including body size recommendations. The following criteria must be met:
A. Age ≤ 16 years, or age specific to FDA approved guidelines;
B. Severe isolated left ventricular or biventricular dysfunction;
C. As a bridge to heart transplant for members/enrollees who require circulatory support.

~~**II.** Pediatric-specific VADs are considered medically necessary if FDA approved or approved under the FDA Humanitarian Device Exemption (HDE) guidelines and used in accordance with the device specific inclusion and exclusion creteria, including body size recommendations.~~
~~A. The following criteria must be met:~~
~~1. Age ≤ 16 years, or age specific to FDA approved guidelines, and~~
~~2. Severe isolated left ventricular or biventricular dysfunction, and~~
~~3. As a bridge to heart transplant for members/enrollees who require circulatory support.~~

III. Any requests for VADs not meeting the above criteria will be considered **not medically necessary.**

Note: A humanitarian device exemption (HDE) is granted by FDA. A Humanitarian Use Device (HUD) is a device that is intended to benefit patients in the treatment or diagnosis of a disease or condition that affects fewer than 4,000 individuals in the United States annually. An HUD may only be used in facilities that have established a local institutional review board to supervise clinical testing of devices and after an IRB has approved the use of the device to treat or diagnose the specific disease.

Background
Ventricular assist devices (VADs) have proven beneficial to myocardial function through improvement in myocardial contractile performance, reversal of down regulation of beta-receptors in heart failure, restoration of the ability of the heart to respond to the inotropic effects of sympathetic stimulation, normalization of chamber geometry and reduction of myocardial fibrosis, hypertrophy, and disruption in cytoskeletal proteins. These benefits suggest that failing human myocytes are capable of undergoing beneficial functional and electrophysiological

changes and can have increased contractile strength in the presence of hemodynamic unloading and improved neurohumoral and circulatory derangements. This remodeling is generally takes approximately 40 days, and shows both clinical benefit and improvement in quality of life.

~~VADs have shown beneficial effects on myocardial function through improvement in myocardial contractile performance; reversal of down regulation of betareceptors seen in heart failure (HF), with restoration in the ability of the heart to respond to the inotropic effects of sympathetic stimulation; and normalization of chamber geometry, and reduction of myocardial fibrosis, hypertrophy, and disruption in cytoskeletal proteins.~~

~~This suggests that failing human myocytes have the capability of undergoing beneficial functional and electrophysiologic changes and an increase in contractile strength in the presence of hemodynamic unloading and improved neurohumoral and circulatory derangements. This remodeling generally is complete by about 40 days, with evidence of clinical benefit and an improvement in quality of life.~~

Since 2000, there have been improved outcomes in VAD implantation in the pediatric population. Early experience involved the most critically ill children who often were near death at the time of VAD implantation. More recently, centers' increasing experience with the surgical techniques, timing, and postoperative care; the use of more long-term devices over time; and refinements in patient selection, have resulted in improved outcomes despite the increasing use of VADs in smaller and more complex patients. Further study is warranted to optimize criteria for pediatric patient and device selection.

In one study reported by Blume, et al, 86% of pediatric patients who received a VAD were successfully bridged to transplantation from 2000 to 2003. Prior to 2000, only 63% of pediatric patients were successfully bridged to transplantation. The subgroups of patients with congenital heart disease and in smaller, younger patients, who rarely are large enough for most long-term assist devices, did not have as successful applications as the rest of the population.

A prospective multi-institutional investigational device exemption trial compared patients with the Berlin Heart EXCOR with a control group supported on extracorporeal membrane oxygenation (ECMO). Between May 2009 and December 2010, a total of 48 patients ≤16 years of age met the inclusion criteria and were separated into 2 cohorts according to body surface area (cohort 1, <0.7 m2; cohort 2, ≥0.7 m2) with 24 patients in each group. The median survival time for cohorts 1 and 2 (>174 and 144 days, respectively) far exceeded that of ECMO (cohort 1, 13 days; cohort 2, 10 days; P<0.001 by log-rank test). Based on the results of this trial, the Berlin Heart EXCOR was granted HDE approval as a device to provide long-term mechanical circulatory support as a bridge to cardiac transplantation in children with severe left or biventricular dysfunction. [19]

The Post Approval Surveillance report released on the EXCOR Pediatric VAD showed positive contemporary results; reported stroke rate 11% and mortality rate of 12.5%, exceeding primary objectives.

There have been several pediatric VADs approved by the FDA, i.e., The HeartAssist 5 Pediatric VAD, previously known as the DeBakey BAD Child Left Ventricular Assist System and the Berlin Heart's EXCOR VAD.

American College of Cardiology Foundation/American Heart Association
Nondurable mechanical circulatory support including the use of a percutaneous and extracorporeal ventricular assist device is reasonable as a 'bridge to recovery'. [17]

American Heart Association[24]
The most recent American Heart Association scientific statement suggests placement of temporary MCS (mechanical circulatory support) devices for patients with longer expected recovery times in the case of cardiogenic shock as "a bridge to recovery, bridge to transplantation or a bridge to decision strategy".

National Health Service
This organization currently funds the use of long-term VADs as bridge-to-transplant to support heart transplant candidates who are too unwell to undergo the procedure or are unlikely to survive in a good clinical state until a suitable donor heart becomes available. [18]

Coding Implications
This clinical policy references Current Procedural Terminology (CPT®). CPT® is a registered trademark of the American Medical Association. All CPT codes and descriptions are copyrighted 2020, American Medical Association. All rights reserved. CPT codes and CPT descriptions are from the current manuals and those included herein are not intended to be all-inclusive and are included for informational purposes only. Codes referenced in this clinical policy are for informational purposes only. Inclusion or exclusion of any codes does not guarantee coverage and may not support medical necessity. Providers should reference the most up-to-date sources of professional coding guidance prior to the submission of claims for reimbursement of covered services.

CPT® Codes	Description
33975	Insertion of ventricular assist device; extracorporeal, single ventricle
33976	Insertion of ventricular assist device; extracorporeal, biventricular
33977	Removal of ventricular assist device; extracorporeal, single ventricle
33978	Removal of ventricular assist device; extracorporeal, biventricular
33979	Insertion of ventricular assist device, implantable intracorporeal, single ventricle
33980	Removal of ventricular assist device, implantable intracorporeal, single ventricle
33981	Replacement of extracorporeal ventricular assist device, single or biventricular, pump(s), single or each pump
33982	Replacement of ventricular assist devices pump(s); implantable intracorporeal, single ventricle, without cardiopulmonary bypass
33983	Replacement of ventricular assist devices pump(s); implantable intracorporeal, single ventricle, with cardiopulmonary bypass

CPT® Codes	Description
33990	Insertion of ventricular assist device, percutaneous including radiological supervision and interpretation; left heart, arterial access only
33991	Insertion of ventricular assist device, percutaneous including radiological supervision and interpretation; left heart, both arterial and venous access, with transseptal puncture
33992	Removal of percutaneous ventricular assist device, arterial or arterial and venous cannula(s), at separate and distinct session from insertion

HCPCS Codes	Description
Q0478	Power adapter for use with electric or electric/pneumatic ventricular assist device, vehicle type
Q0479	Power module for use with electric or electric/pneumatic ventricular assist device, replacement only
Q0480	Driver for use with pneumatic ventricular assist device, replacement only
Q0481	Microprocessor control unit for use with electric ventricular assist device, replacement only
Q0482	Microprocessor control unit for use with electric/pneumatic combination ventricular assist device, replacement only
Q0483	Monitor/display module for use with electric ventricular assist device, replacement only
Q0484	Monitor/display module for use with electric or electric/pneumatic ventricular assist device, replacement only
Q0485	Monitor control cable for use with electric ventricular assist device, replacement only
Q0486	Monitor control cable for use with electric/pneumatic ventricular assist device, replacement only
Q0487	Leads (pneumatic/electrical) for use with any type electric/pneumatic ventricular assist device, replacement only
Q0488	Power pack base for use with electric ventricular assist device, replacement only
Q0489	Power pack base for use with electric/pneumatic ventricular assist device, replacement only

ICD-10-CM Diagnosis Codes that Support Coverage Criteria

ICD-10-CM Code	Description
I50.1	Left ventricular failure, unspecified
I50.20	Unspecified systolic (congestive) heart failure
I50.82	Biventricular heart failure
I50.84	End stage heart failure
I50.9	Heart failure, unspecified
I97.0	Postcardiotomy syndrome

ICD-10-CM Code	Description
Z95.811	Presence of heart assist device
Z76.82	Awaiting organ transplant status

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Converted corporate to local policy.	08/15/2020	
Annual review. References reviewed and updated. Removed ICD-10 code Z94.1 and added Z76.82. Replaced all instances of "member" with members/enrollees. Removed mention of Berlin Heart EXCOR Pediatric VAD under II.A as other pediatric VAD's are being approved. Added "if FDA approved or approved under the FDA HDE guidelines and used in accordance with the device specific inclusion/exclusion criteria, including body size." to II. Added "or age specific to FDA approved guidelines to II.A.1. Changed II.A.3 from "Is a candidate for heart transplant" to "As a bridge to heart transplant." Revised description of CPT-33990, 33991 and 33992.	3/21	3/26/22
Annual review. References reviewed and updated to AMA format. Changed "review date" in the header to "Date of Last Revision" and "Date" in the revision log header to "Revision Date." Added "Cardiac Index (CI) <2.2 L/min/m^2, while not on inotropes and meet one of the following criteria: 1. No response to optimal medical management (including beta-blockers and ACE inhibitors, if tolerated, for at least 45 out of the last 60 days; 2. Presence of advanced heart failure for at least 14 days with dependence on an intra-aortic balloon pump (IABP) or similar temporary mechanical circulatory support for at least 7 days" to Policy/Criteria I.B.4 to reflect update to NCD Ventricular Assist Devices 20.9.1 per CMS. Background updated with most recent AHA scientific statement regarding placement of MCS (mechanical circulatory support) devices with no impact on criteria. Reviewed by specialist. Added "and may not support medical necessity" to Coding Implications section.	5/22	

References

1. Birks EJ. Intermediate- and long-term mechanical circulatory support. UpToDate. www.uptodate.com. Updated July 8, 2020. Accessed January 4, 2022.
2. Blume ED, Naftel DC, Bastardi HJ, et al. Outcomes of children bridged to heart transplantation with ventricular assist devices: a multi-institutional study. *Circulation*. 2006;113(19):2313-2319. doi:10.1161/CIRCULATIONAHA.105.577601
3. National coverage determination: Ventricular assist device (20.9.1). Centers for Medicare and Medicaid Services Web site: https://www.cms.gov/medicare-coverage-database. Effective December 1, 2020. Accessed January 6, 2022.
4. Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed

with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur Heart J*, 37(27). July 2016, p. 2129–2200.
5. Miller LW, Guglin M. Patient selection for ventricular assist devices: a moving target. *J Am Coll Cardiol*. 2013;61(12):1209-1221. doi:10.1016/j.jacc.2012.08.1029
6. Feldman D, Pamboukian SV, Teuteberg JJ, et al. The 2013 International Society for Heart and Lung Transplantation guidelines for mechanical circulatory support: Executive summary. *J Heart Lung Transplant*. 2013;32(2):157-187.
7. U.S. Food and Drug Administration. FDA approves mechanical cardiac assist device for children with heart failure. Cision Press Release Newswire. https://www.prnewswire.com/news-releases/fda-approves-mechanical-cardiac-assist-device-for-children-with-heart-failure-135752843.html. Published December 16, 2011. Accessed January 7, 2022.
8. U.S. Department of Health & Human Services, FDA. Medical devices: Device approvals and clearances. DeBakey VAD® Child – H030003. https://www.accessdata.fda.gov/cdrh_docs/pdf3/H030003A.pdf. February 2011. Accessed January 7, 2022.
9. U.S. Department of Health & Human Service, FDA. Medical devices: Device approvals and clearances. Berlin Heart EXCOR® Pediatric Ventricular Assist Device (VAD) – H100004. https://www.accessdata.fda.gov/cdrh_docs/pdf10/H100004A.pdf. Published December 2011. Accessed January 7, 2022.
10. Fraser, CD. Berlin Heart's EXCOR® Pediatric Ventricular Assist Device (VAD) receives FDA approval. *Businesswire*. December 16, 2011.
11. Miller, R. FDA panel endorses HDE for Berlin Heart Excor Pediatric VAD. *Heartwire.* July 22, 2011.
12. Drummond A. Biomedical surgical planning for pediatric ventricular assist device (PVAD). Dissertation document for Carnegie Mellon University, Carnegie Institute of Technology. 2008.
~~13.~~ Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on practice guidelines. *J Am Coll Cardiol.* 2013;62(16):e147-e239. https://www.jacc.org/doi/full/10.1016/j.jacc.2013.05.019
14. National Health Services Division. The clinical and cost-effectiveness of long-term ventricular assist devices (VADs) as a bridge to transplant in adults. *Health Improvement Scotland.* July 2011.
15. 15. Vanderpluym CJ, Fynn-Thompson F, Blume ED. Ventricular assist devices in children: progress with an orphan device application. *Circulation.* 2014;129(14):1530-1537. doi:10.1161/CIRCULATIONAHA.113.005574 [LKV1]
16. Jeevanandam V, Eisen H, Pinto, D. Short-term mechanical circulatory assist devices. UpToDate. www.uptodate.com. Updated September 3, 2020. Accessed January 4, 2022.
17. Yarlagadda VV, Maeda K, Zhang Y, et al. Temporary Circulatory Support in U.S. Children Awaiting Heart Transplantation. *J Am Coll Cardiol*. 2017;70(18):2250-2260. doi:10.1016/j.jacc.2017.08.072
18. Bulic A, Maeda K, Zhang Y, et al. Functional status of United States children supported with a left ventricular assist device at heart transplantation. *J Heart Lung Transplant*. 2017;36(8):890-896. doi:10.1016/j.healun.2017.02.024

19. Peura JL, Colvin-Adams M, Francis GS, et al. Recommendations for the use of mechanical circulatory support: device strategies and patient selection: a scientific statement from the American Heart Association. *Circulation.* 2012;126(22):2648-2667. doi:10.1161/CIR.0b013e3182769a54
20. Yancy CW, Jessup M, Bozkurt B, et al. 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Failure Society of America. *J Card Fail*. 2017;23(8):628-651. doi:10.1016/j.cardfail.2017.04.014
21. Singh RK, Singh TP. Heart failure in children: Management. UpToDate. www.uptodate.com. Updated June 5, 2019. Accessed January 4, 2022.
22. Dipchand AI, Kirk R, Naftel DC, et al. Ventricular Assist Device Support as a Bridge to Transplantation in Pediatric Patients. *J Am Coll Cardiol*. 2018;72(4):402-415. doi:10.1016/j.jacc.2018.04.072
23. Caldeira CCB, Machado RC, Caldeira DCB. Implantation of Short-Term and Long-Term Right Ventricular Assist Devices. *Braz J Cardiovasc Surg*. 2017;32(5):435-437. doi:10.21470/1678-9741-2017-0021
24. Ni hIci T, Boardman HMP, Baig K, Stafford JL, et al. Mechanical assist devices for acute cardiogenic shock. *Cochrane Database of Systematic Reviews* 2020, Issue 6. Art. No.: CD013002. DOI: 10.1002/14651858.CD013002.pub2. Accessed January 13, 2022.
1. Birks EJ. Intermediate- and long-term mechanical circulatory support. In: UpToDate, Mancini D, Hunt, SA (Ed), Waltham, MA. Accessed 1/20/2021.
2. Blume ED, et al. Outcomes of children bridged to heart transplantation with ventricular assist devices. Circulation, 2006;113:2313-2319.
3. Department of Health & Human Services, Centers for Medicare & Medicaid Services. National coverage determination (NCD) for artificial hearts and related devices. Pub 100-03,20.9. Effective Nov, 2013.
4. Ponikowski P, Voors AA, Anker SD, et al., ESC Scientific document group. 2016 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). *European Heart Journal*, 37(27). July 2016, p. 2129–2200. Accessed 1/22/21 at https://academic.oup.com/eurheartj/article/37/27/2129/1748921
5. Developed with the special contribution of the Heart Failure Association (HFA) of the ESC Miller LW, Guglin M. Patient Selection for Ventricular Assist Devices: A Moving Target. *J Am Coll Cardiol*. 2013;61(12):1209-1221. doi:10.1016/j.jacc.2012.08.1029.
6. Feldman D, Pamboukian SV, Teuteberg JJ, Birks E, Lietz K, Moore SA, et al; International Society for Heart and Lung Transplantation. The 2013 International Society for Heart and Lung Transplantation Guidelines for mechanical circulatory support: executive summary. J Heart Lung Transplant. 2013 Feb;32(2):157-87.
7. FDA approves mechanical cardiac assist device for children with heart failure. FDA News Release. December 16, 2011.
8. U.S. Department of Health & Human Service, FDA. Medical Devices: Device Approvals and Clearances. DeBakey VAD® Child – H030003. Feb, 2004. Accessed at: https://www.accessdata.fda.gov/cdrh_docs/pdf3/H030003A.pdf
9. U.S. Department of Health & Human Service, FDA. Medical Devices: Device Approvals and Clearances. Berlin Heart EXCOR® Pediatric Ventricular Assist Device (VAD) –

H100004. Dec, 2011. Accessed at: https://www.accessdata.fda.gov/cdrh_docs/pdf10/H100004A.pdf
10. Fraser, C.D., MD. Berlin Heart's EXCOR® Pediatric Ventricular Assist Device (VAD) receives FDA Approval. Businesswire. December 16, 2011. Accessed at: http://www.businesswire.com/news/home/20111216005735/en/Berlin-Heart%E2%80%99s-EXCOR%C2%AE-Pediatric-Ventricular-Assist-Device
11. Hayes Medical Technology Directory. Left ventricular assist devices (LVADs) in adult patients with chronic, end-stage heart failure. Aug. 2010, archived Sep. 2015. Accessed 2/12/2019.
12. Miller, R. FDA panel endorses HDE for Berlin Heart's Excor Pediatric VAD. Heartwire. July 22, 2011.
13. Drummond A. Biomedical Surgical Planning for Pediatric Ventricular Assist Device (PVAD). Dissertation document for Carnegie Mellon University, Carnegie Institute of Technology. 2008.
14. Yancy CW, Jessup M, Bozkurt B, et al.; American College of Cardiology Foundation; American Heart Association Task Force on Practice Guidelines. 2013 ACCF/AHA guideline for the management of heart failure: A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2013;62(16):e147-e239.
15. National Health Services Division. The clinical and cost-effectiveness of long-term ventricular assist devices (VADs) as a bridge to transplant in adults. Health Improvement Scotland. Number 39. July 2011.
16. VanderPluym CJ, Flynn-Thompson F, Blume ED. Ventricular Assist Devices in Children Progress with an Orphan Device Application. Challenges and Opportunities in Pediatric Heart Failure and Transplantation. Circulation. April 2014.
17. Centers for Medicare and Medicaid Services. National Coverage Determination (NCD) for Ventricular Assist Devices. (20.9.1). 10/30/13.
18. Aroesty JM, Jeevanandam V, Eisen H. Short-term mechanical circulatory assist devices. In: UpToDate, Cutlip D (Ed), UpToDate, Waltham, MA. Accessed Jan 21, 2021
19. Yarlagadda VV, Maeda K, Zhang Y, et al. Temporary Circulatory Support in U.S. Children Awaiting Heart Transplantation. J Am Coll Cardiol. 2017 Oct 31;70(18):2250-2260. doi: 10.1016/j.jacc.2017.08.072.
20. Bulic A, Maeda K, Zhang Y, et al. Functional status of United States children supported with a left ventricular assist device at heart transplantation. J Heart Lung Transplant. 2017 Aug;36(8):890-896. doi: 10.1016/j.healun.2017.02.024. Epub 2017 Mar 2
21. Peura JL, Colvin-Adams M, Francis GS, et al. Recommendations for the Use of Mechanical Circulatory Support: Device Strategies and Patient Selection. A Scientific Statement From the American Heart Association. Circulation. 2012;126:2648-2667.
22. Yancy CW, Jessup M, Bozkurt B, et al., 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Failure Society of America. J Card Fail. 2017 Aug;23(8):628-651. doi: 10.1016/j.cardfail.2017.04.014.
23. Rose EA, Geliijns AC, Moskowitz AJ, et al. Long-term use of a left ventricular assist device for end-stage heart failure. N Engl J Med 2001; 345:1435-1443. DOI: 10.1056/NEJMoa012175.

~~24. Singh RK, Singh TP. Heart failure in children: Management. In: UpToDate, Triedman JK (Ed), UpToDate, Waltham, MA. Accessed 1/21/2021~~
~~25. Dipchand AI, Kirk R, Naftel DC, et al. Ventricular assist device support as a bridge to transplantation in pediatric patients. J Am Coll Cardiol. 2018 Jul 24;72(4):402-415. doi: 10.1016/j.jacc.2018.04.072.~~
~~26. Caldeira CCB, Machado RC, Caldeira DCB. Implantation of Short-Term and Long-Term Right Ventricular Assist Devices. Braz J Cardiovasc Surg. 2017 Sep-Oct;32(5):435-437. doi: 10.21470/1678-9741-2017-0021.~~

Important Reminder
This clinical policy has been developed by appropriately experienced and licensed health care professionals based on a review and consideration of currently available generally accepted standards of medical practice; peer-reviewed medical literature; government agency/program approval status; evidence-based guidelines and positions of leading national health professional organizations; views of physicians practicing in relevant clinical areas affected by this clinical policy; and other available clinical information. LHCC makes no representations and accepts no liability with respect to the content of any external information used or relied upon in developing this clinical policy. This clinical policy is consistent with standards of medical practice current at the time that this clinical policy was approved.

The purpose of this clinical policy is to provide a guide to medical necessity, which is a component of the guidelines used to assist in making coverage decisions and administering benefits. It does not constitute a contract or guarantee regarding payment or results. Coverage decisions and the administration of benefits are subject to all terms, conditions, exclusions and limitations of the coverage documents (e.g., evidence of coverage, certificate of coverage, policy, contract of insurance, etc.), as well as to state and federal requirements and applicable LHCC administrative policies and procedures.

This clinical policy is effective as of the date determined by LHCC. The date of posting may not be the effective date of this clinical policy. This clinical policy may be subject to applicable legal and regulatory requirements relating to provider notification. If there is a discrepancy between the effective date of this clinical policy and any applicable legal or regulatory requirement, the requirements of law and regulation shall govern. LHCC retains the right to change, amend or withdraw this clinical policy, and additional clinical policies may be developed and adopted as needed, at any time.

This clinical policy does not constitute medical advice, medical treatment or medical care. It is not intended to dictate to providers how to practice medicine. Providers are expected to exercise professional medical judgment in providing the most appropriate care, and are solely responsible for the medical advice and treatment of members. This clinical policy is not intended to recommend treatment for members. Members should consult with their treating physician in connection with diagnosis and treatment decisions.

Providers referred to in this clinical policy are independent contractors who exercise independent judgment and over whom LHCC has no control or right of control. Providers are not agents or employees of LHCC.